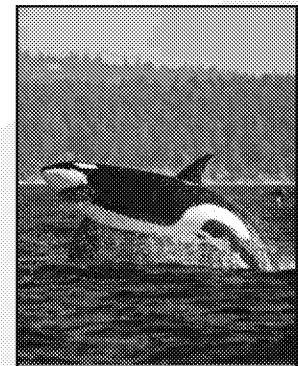
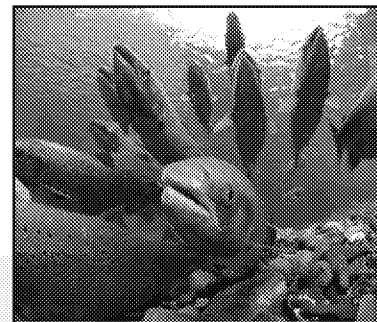
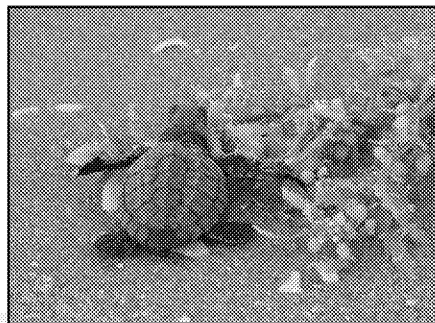


NOAA
FISHERIES

National FIFRA Pesticide Consultation: Diazinon, Chlorpyrifos, Malathion RPA/RPM

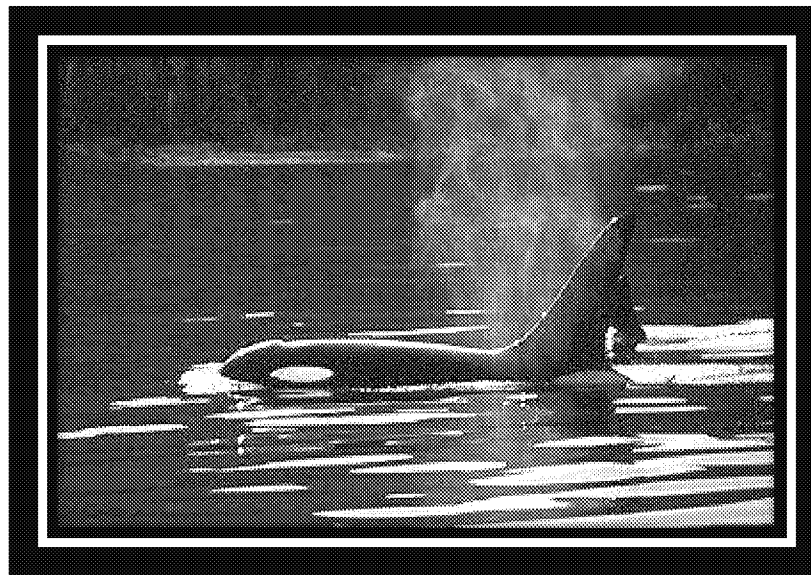
September 25, 2018

Office of Protected Resources - Cathy Tortorici, Thom Hooper, Tony Hawkes, Ryan DeWitt
NW Science Center - David Baldwin, Cathy Laetz, Julann Spromberg



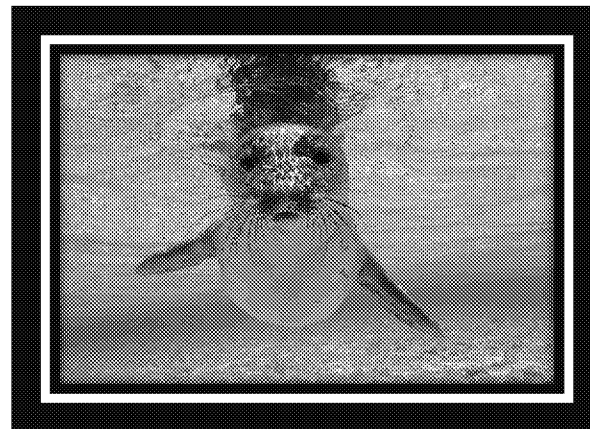
Topics Covered

- Summary of the consultation Process
- Discussion of NMFS' recommended Risk Reduction Measures (RPAs)



Interagency Cooperation: Section 7(a)(2)

- Requires federal agencies to insure that any action authorized, funded, or carried out is not likely to:
 - Jeopardize T/E species
 - Result in destruction or adverse modification of designated critical habitat



Agencies Involved in FIFRA Consultations

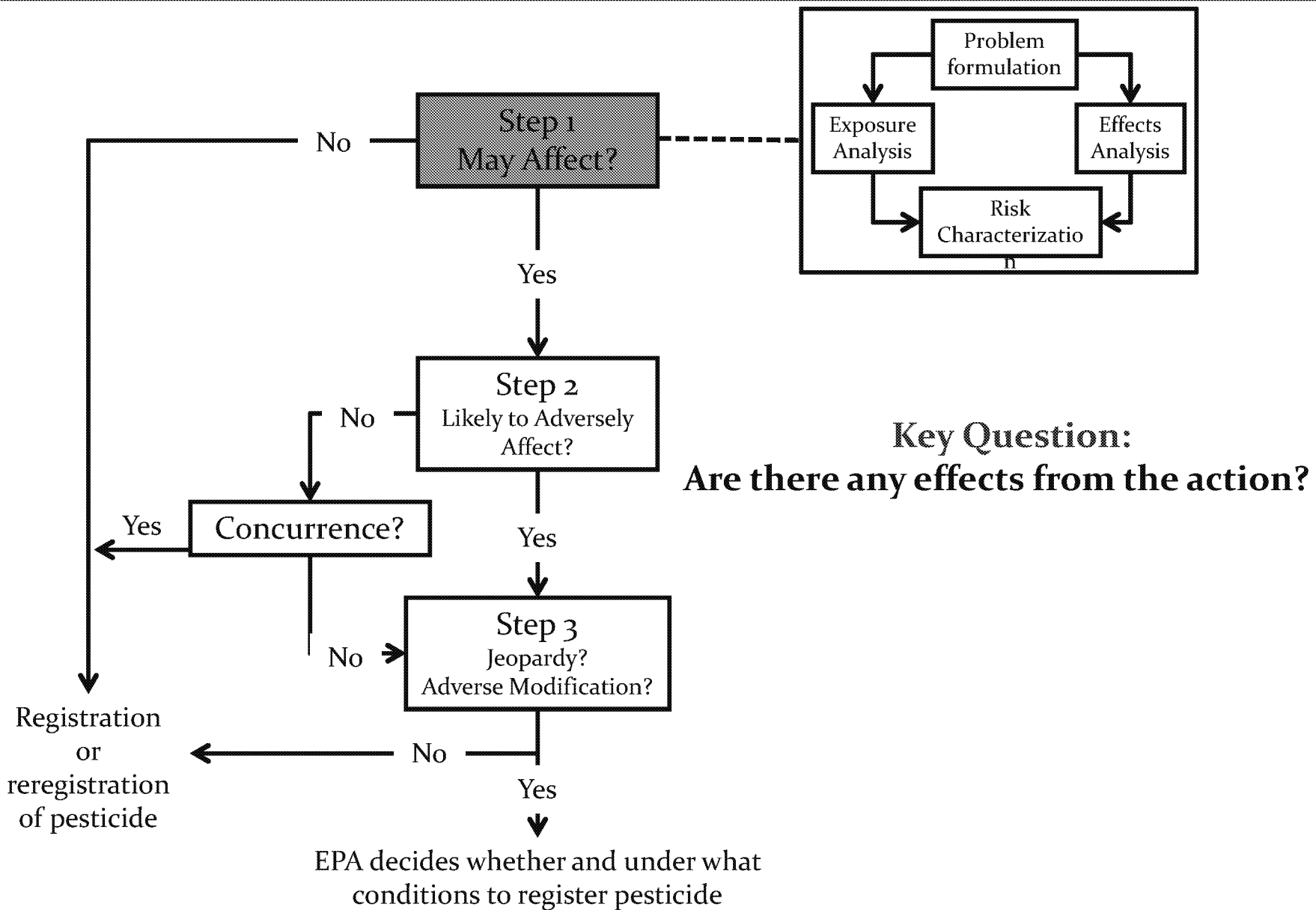
Action Agency: Federal agency that authorizes, funds, or carries out action that may affect a federally listed species.

EPA- Authorization of pesticide use/FIFRA Labels

Consulting Agency: Depend on jurisdiction:

NMFS- Marine species

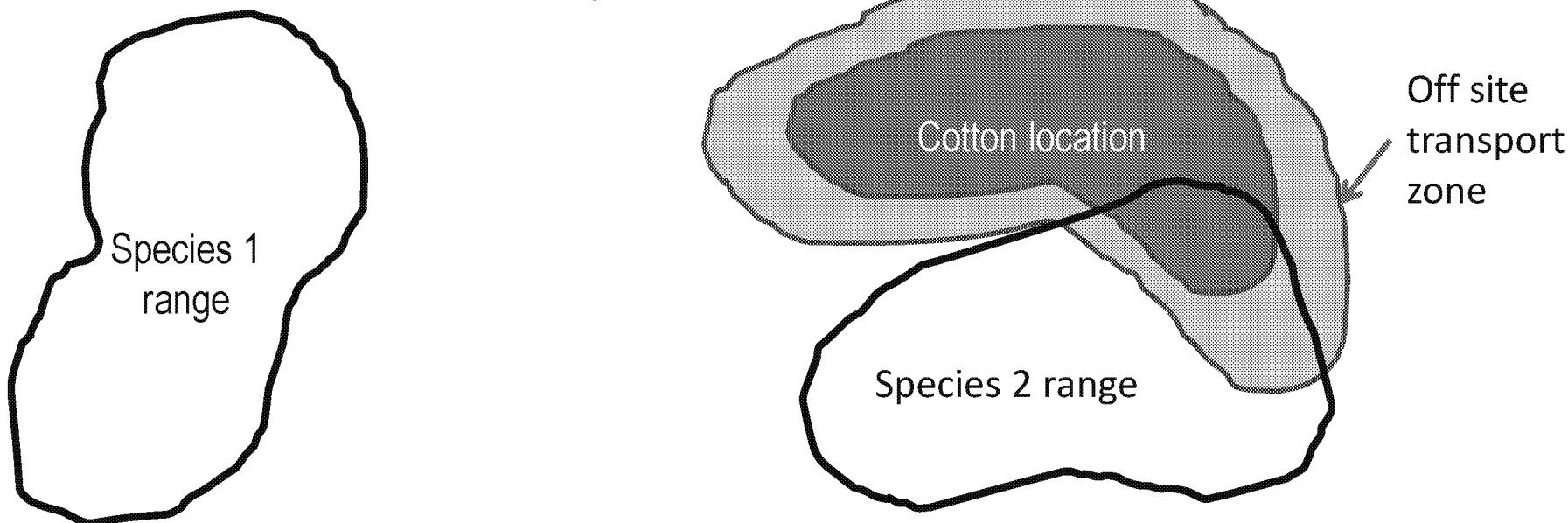
USFWS-Freshwater and terrestrial species



Risk Characterization: Step 1

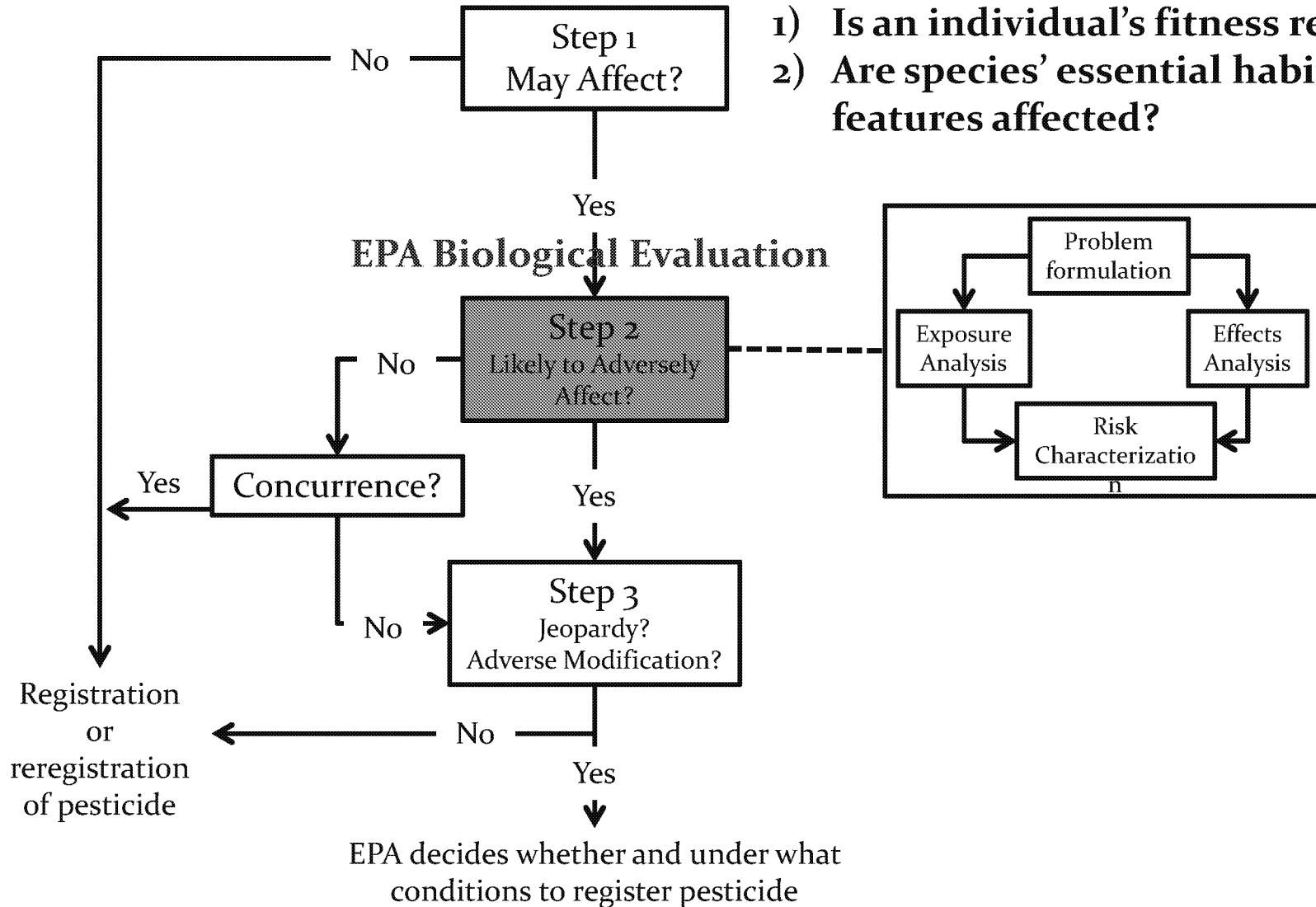
Example:

- Action = use of Pesticide x on cotton
- Determinations
 - Species 1 = "No Effect"
 - Species 2 = "May Affect"



Key Questions:

- 1) Is an individual's fitness reduced?
- 2) Are species' essential habitat features affected?



EPA Determinations

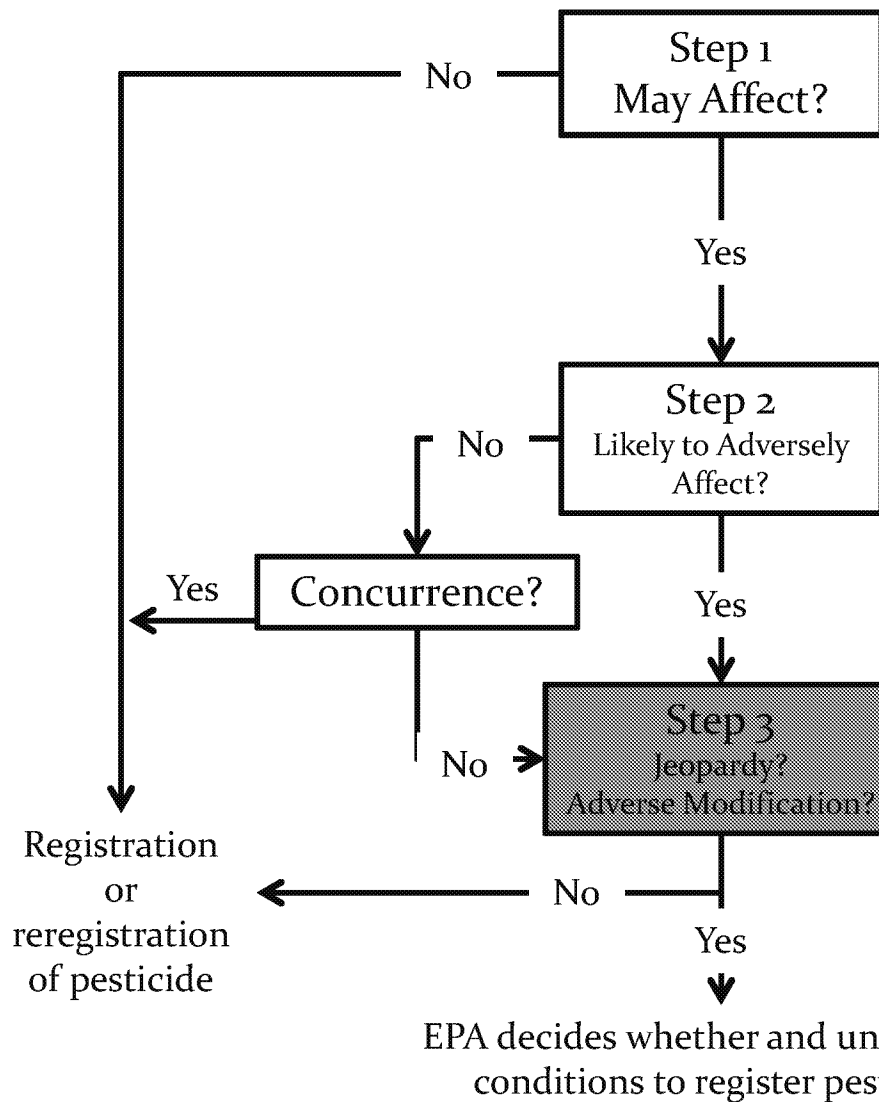
NLAA (19)

- Pinnipeds (2)
- Sharks (6)
- Cetaceans (11)

LAA (77)

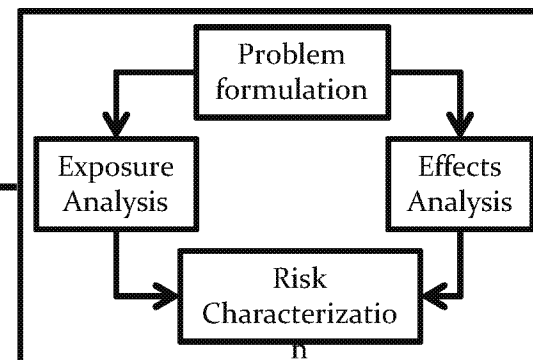
- Anadromous fish (38)
- Marine fish (5)
- Invertebrates (16)
- Sea turtles (12)
- Pinnipeds (4)
- Johnson's seagrass
- Southern resident killer whale

NMFS Biological Opinion



Key Questions:

- 1) Does the action affect the recovery of the species?
- 2) Is the conservation value of the Designated Critical Habitat reduced?



Biological Opinion Conclusions

Species Group	Notes
Salmonids, sturgeon, eulachon	Majority of jeopardies
Cetaceans	Jeopardy for southern resident orca based on reductions in prey
Marine fish	Jeopardy for smalltooth sawfish
Pinnipeds	No jeopardy
Turtles	No jeopardy
Coral and Abalone	No jeopardy
Plants	No jeopardy

Species Analysis (77)	Jeopardy calls:
	Chlorpyrifos = 38
	Diazinon = 25
	Malathion = 38

Critical Habitat Analysis (50)	Adverse Mod. calls:
	Chlorpyrifos = 37
	Diazinon = 18
	Malathion = 37

Defining RPAs, RPMs

Reasonable and Prudent Alternative (RPA)

- Avoids the likelihood of Jeopardy and Adverse Mod
- Consistent with intended purpose of action
- Consistent with the scope of EPA's legal authority
- Economically and technologically feasible

Reasonable and Prudent Measure (RPM)

- Required for both Jeopardy and non-Jeopardy species
- Required to minimize Take
- Include non-discretionary terms and conditions for EPA to be exempt from Take of ESA-listed species

RPA in December 2017 Biological Opinion

“For each active ingredient, the elements of the RPA apply only to the range of the ESUs/DPSs where NMFS has determined that EPA cannot ensure that its registration of that a.i. avoids jeopardy or the destruction or adverse modification of critical habitat (Chapter 25). “

“The RPA and RPM for each of the three pesticides apply to applications on high risk use sites within 300 meters adjacent to, or that drain to listed species aquatic habitats for which jeopardy or adverse modification of designated critical habitat was determined.”

High risk uses are those which received a high rating for effect of exposure and a high or medium rating for likelihood of exposure as presented in the Effects of the Proposed Action.

RPA in December 2017 Biological Opinion

Five distinct elements are required to ensure jeopardy is avoided and to ensure designated critical habitat is not destroyed or modified. These elements are:

1. Reduce pesticide loading for high risk use sites;
2. Limit the frequency of application to once per year for persistent pesticides i.e., chlorpyrifos;
3. Limit area of application for mosquito control;
4. Limit area of application for wide area use;
5. Employ an effectiveness monitoring plan.

1. Reduce pesticide loading for high risk use sites.

Choose 1(a) or 1(b) or 1(c).

1(a) Remove label authorization for all high risk uses. If current usage on use sites effectively reduces exposure*, modify labels to reflect current usage.

1(b) Modify labels to include standard buffers and vegetative filter strips: 300 meter no-spray buffer for all aerial applications; 150 meter buffer for all ground applications; 6 meter vegetative filter strip for all applications.

1(c) Point System. Implement a combination of risk reduction measures to reduce pesticide drift, runoff, and drainage.

**Requires NMFS concurrence that EPA-proposed alternative based on usage information effectively reduces exposure*

RPA in December 2017 Biological Opinion

Five distinct elements are required to ensure jeopardy is avoided and to ensure designated critical habitat is not destroyed or modified. These elements are:

1. Reduce pesticide loading for high risk use sites;
2. Limit the frequency of application to once per year for persistent pesticides i.e., chlorpyrifos;
3. Limit area of application for mosquito control;
4. Limit area of application for wide area use;
5. Employ an effectiveness monitoring plan.

RPA in December 2017 Biological Opinion

Five distinct elements are required to ensure jeopardy is avoided and to ensure designated critical habitat is not destroyed or modified. These elements are:

1. Reduce pesticide loading for high risk use sites;
2. Limit the frequency of application to once per year for persistent pesticides i.e., chlorpyrifos;
3. Limit area of application for mosquito control;
4. Limit area of application for wide area use;
5. Employ an effectiveness monitoring plan.

Malathion and Chlorpyrifos Labels: lack geographic restriction on mosquito apps

Malathion Master Use Summary (Excerpt)

Use Site	Method	Maximum Single Application Rate (lb a.i./A)	Maximum Application Rate (per year in lb a.i./acre) (for all formulations combined, unless otherwise noted)	Maximum Application Number (per year)	Minimum Retreatment Interval
Alfalfa	Ground/Aerial	1.25	NS	NS	14
Apricots	Ground/Aerial	1.5	NS	2	7
Pasture and Rangeland	Ground/Aerial	0.92	NS	NS	7
Mosquitoes/Wide Area Public Health	Ground/Aerial	0.23	NS	NS	NS

NMFS' Recommendation: Limit these vector control applications within jeopardized species range to areas they are needed (i.e. residential and developed areas).

RPA in December 2017 Biological Opinion

Five distinct elements are required to ensure jeopardy is avoided and to ensure designated critical habitat is not destroyed or modified. These elements are:

1. Reduce pesticide loading for high risk use sites;
2. Limit the frequency of application to once per year for persistent pesticides i.e., chlorpyrifos;
3. Limit area of application for mosquito control;
4. Limit area of application for wide area use;
5. Employ an effectiveness monitoring plan.

Chlorpyrifos labels contain no geographical restrictions on wide area outdoor treatment

Crop/Site	Timing: Application Type	Method/ Equipment	Maximum Single Application Rate by Formulation ¹ (lb a.i./A)	Maximum Application Rate		Maximum Application Number		Geographic Restrictions	Label
WIDE AREA/ GENERAL OUTDOOR TREATMENT For ants and other misc. pests.	when needed, Broadcast	Ground sprayer	0.5084 lb a.i./100 gal EC	[1.02] NS	NA	2	NA	NA	66222-19
	when needed, Drench	Drench	1.0	NS	NA	NS	NA	NA	228-624
			[1.0] 8.2 lb a.i./100 gal EC	NS	NA	NS	NA	NA	228-625

NMFS' Recommendation: Restrict wide area use to residential and developed areas with spot treatment only.

RPA in December 2017 Biological Opinion

Five distinct elements are required to ensure jeopardy is avoided and to ensure designated critical habitat is not destroyed or modified. These elements are:

1. Reduce pesticide loading for high risk use sites;
2. Limit the frequency of application to once per year for persistent pesticides i.e., chlorpyrifos;
3. Limit area of application for mosquito control;
4. Limit area of application for wide area use;
5. Employ an effectiveness monitoring plan.

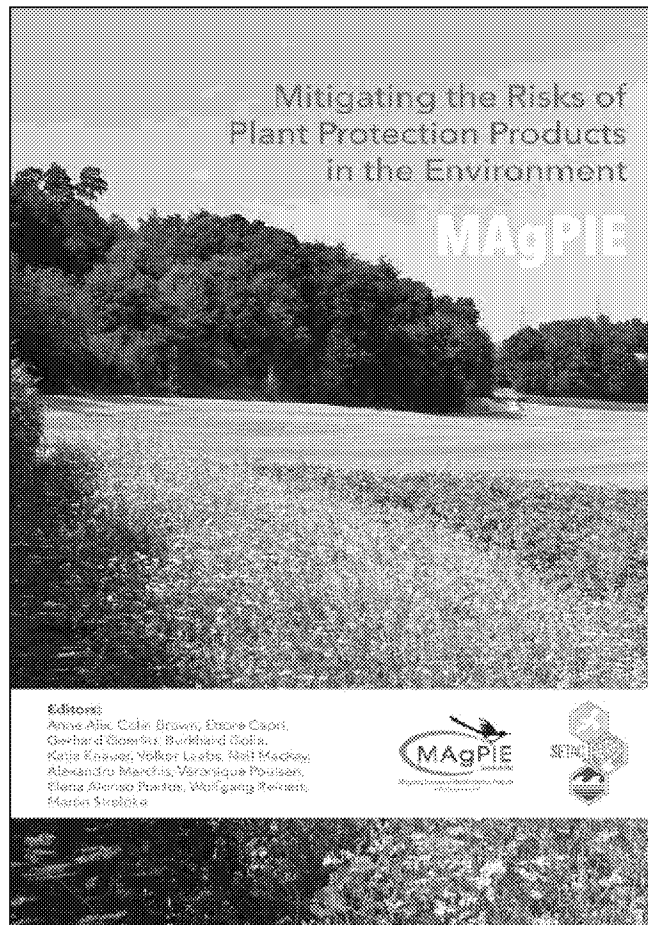
1. Reduce pesticide loading for high risk use sites.

1(c) Point System. Implement a combination of risk reduction measures to reduce pesticide drift, runoff, and drainage.

The “point system” is based, in part, on the European Union’s Mitigating the Risks of Plant Protection Products in the Environment, referred to as MAgPIE (Alix et al. 2017).

- Each risk reduction measure on the list has a point value based on its effectiveness at reducing loading from drift and runoff/drainage.
- The applicator can choose which risk reduction measures to implement as long as the required number of points are achieved for each exposure pathway (drift and runoff/drainage).
- The point system – like the rest of the RPA – is only required for high risk uses.

Mitigating Risk – Adapting to Biological Opinion



- Review of existing runoff mitigation measures and their effectiveness
- Recommendation for method of calculating the overall mitigation effectiveness of combinations of risk mitigation measures.
- See Chapter 4 of MAgPIE

Point System (1c): A Beneficial Approach for Pesticide Applicators

Flexible:

Applicators select what works for them

Feasible:

Based on current practices

Efficacious:

Based on comprehensive report that summarized risk reduction measures' efficacy at reducing pesticide loading (MAgPIE)

Species and Pesticide Specific:

FIFRA Enforceable Label: Directs applicator to EPA's Bulletins Live website which will maintain the geographically-specific requirements (risk reduction only required within species range).

Risk Reduction Measures (points) Linked to Effects Analysis

NMFS Analysis involved

1. Determine the % reduction in exposure for drift and for runoff/drainage necessary for high-risk uses.
2. Determine order of magnitude reduction in loading needed by using R-plots
3. Consult species and habitat scorecards to evaluate influence of environmental baseline and status of the species.
4. Calculate the number of points needed to satisfy the % reduction needed.

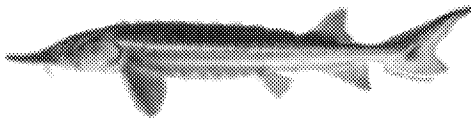
RPA: malathion example

Malathion	Risk Reduction Options for High Risk Uses		
Species	Remove label authorization for all high risk uses	No-spray Buffers: 300m aerial application, or 150m ground application; and 6m vegetative filter strip	Point System: Required Points Drift Runoff/drainage

Eulachon, Pacific smelt, Southern DPS (T)	Pasture Developed	Pasture Developed	80 drift 80 runoff
--	----------------------	----------------------	-----------------------

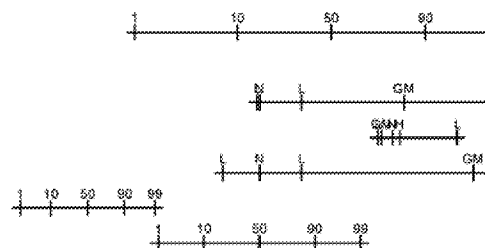


Green sturgeon, Southern DPS (T)	Pasture Developed Orchards and Vineyards Other Crops Corn Vegetables and Ground Fruit Wheat Other Grains Other Row Crops	Pasture Developed Orchards and Vineyards Other Crops Corn Vegetables and Ground Fruit Wheat Other Grains Other Row Crops	70 drift 70 runoff
-------------------------------------	--	--	-----------------------



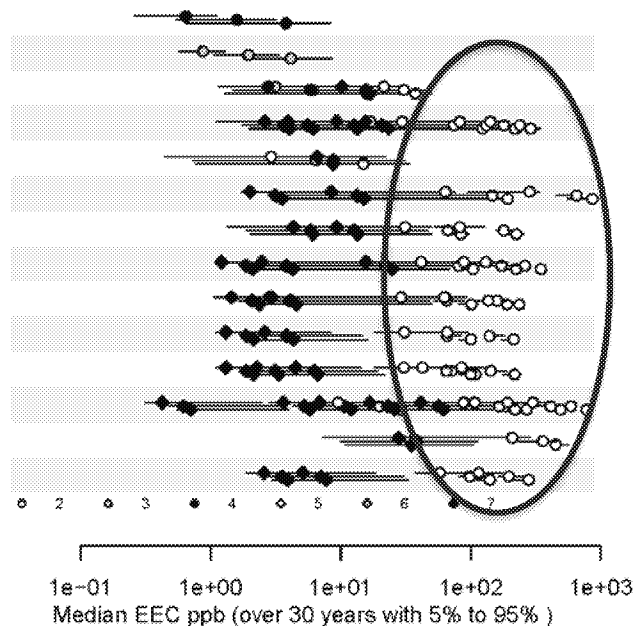
Toxicity Data

Enzyme
Sensory
Behavior
Reproduction
Growth
Prey
Mortality



Uses (median total acres over 6 yrs)

Bin 4 (1498948)
Bin 3 (1498948)
Mosquito Control (1498948)
Pasture (124171)
Developed (106144)
Christmas Trees (6713)
Other Crops (4522)
Vegetables and Ground Fruit (3604)
Corn (2789)
Wheat (2034)
Other Grains (610)
Orchards and Vineyards (592)
Nurseries (528)
Other RowCrops (14)
All HUCs (1498948)



100.0000 (100.0000, 100.000)
100.0000 (100.0000, 100.000)
100.0000 (100.0000, 100.000)
8.2839 (6.3139, 10.309)
7.0812 (7.0812, 7.081)
0.4478 (0.4478, 0.448)
0.3017 (0.1484, 0.386)
0.2404 (0.1372, 0.310)
0.1861 (0.0457, 0.376)
0.1357 (0.0863, 0.188)
0.0407 (0.0135, 0.052)
0.0395 (0.0140, 0.082)
0.0352 (0.0352, 0.035)
0.0009 (0.0007, 0.001)

Median percent of total acres
(over 6 years with min, max)

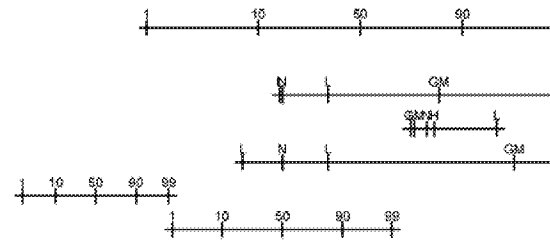
malathion: mal.fish.tox.txt
yearly peak 1-d, 4-d, 21-d (from bottom up)
huc:17a,18a, bin:2,3,4,7
eulachon (List): 64 HUC12s



Figure 31 from BiOp Chapter 14: Effects Analysis R-plot for Eulachon, Southern DPS and Malathion

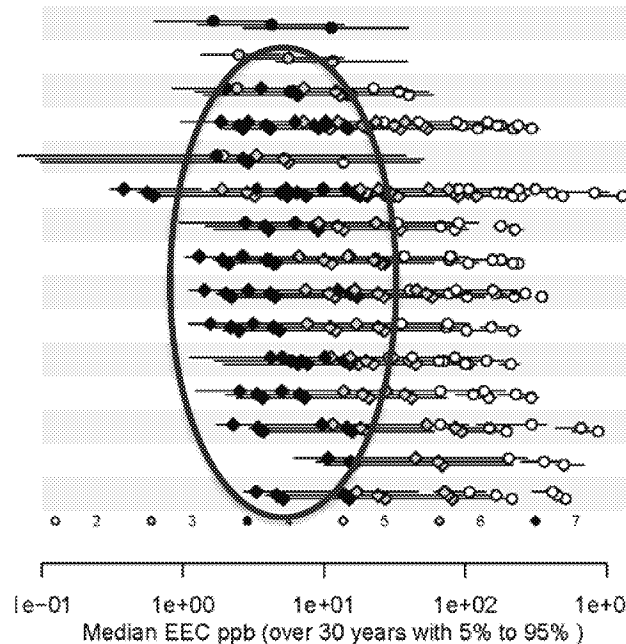
Toxicity Data

Enzyme
Sensory
Behavior
Reproduction
Growth
Prey
Mortality



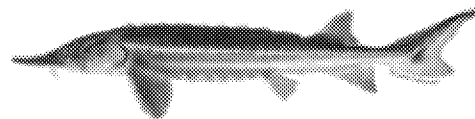
Uses (median total acres over 6 yrs)

Bin 4 (17493573)
Bin 3 (17493573)
Mosquito Control (17493573)
Pasture (2259563)
Developed (1999021)
Orchards and Vineyards (492843)
Other Crops (354884)
Corn (170058)
Vegetables and Ground Fruit (156046)
Wheat (92120)
Other Grains (83916)
Other RowCrops (33919)
Christmas Trees (10516)
Nurseries (10227)
Cotton (1498)
All HUCs (17493573)



100.000 (100.000, 100.00)
100.000 (100.000, 100.00)
100.000 (100.000, 100.00)
12.917 (11.221, 15.34)
11.427 (11.427, 11.43)
2.817 (2.327, 3.00)
2.029 (1.734, 2.65)
0.972 (0.662, 1.20)
0.892 (0.335, 1.09)
0.527 (0.485, 0.92)
0.480 (0.358, 0.59)
0.194 (0.093, 0.25)
0.060 (0.060, 0.06)
0.058 (0.058, 0.06)
0.009 (0.005, 0.03)

Median percent of total acres
(over 6 years with min, max)



malathion: mal.fish.tox.txt
yearly peak 1-d, 4-d, 21-d (from bottom up)
huc:17a,17b,18a,18b, bin:2,3,4,6,7
green.sturgeon (List): 625 HUC12s

Figure 32 from BiOp Chapter 14: Effects Analysis R-plot for Green Sturgeon and Malathion

Point System (1c)

Example - Malathion

- 80 points in both drift and runoff measures are required to achieve a 99% reduction in malathion loading; 70 points required for 90% reduction.
- Each risk reduction measure on the list has a point value based on their effectiveness at reducing loading from drift and runoff/drainage.
- Applicator chooses which risk reduction measures to implement as long as the required number of points are achieved for each exposure pathway (drift and runoff/drainage).
- The point system is only required for high risk uses.

Table 4 from BiOp Chapter 26: "Malathion Risk Reduction Measures and Associated Points"

Drift Measures	Estimated % reduction in loading	Points	Runoff/drainage Measures	Estimated % reduction in loading	Points
No Spray Drift Buffers: Ground boom ¹ chemigation buffer 10 meters	90	70	No Spray Buffer ≥ 300 meters to listed species habitat or water that drains to habitat	99	80
Air blast buffer ² : 10 meters 20 meters	80 95	60 75			
Aerial buffer ³ : 20 meters 100 meters 150 meters	35 85 90	15 65 70			
Spray Drift Reduction Technology ⁴ (nozzles, etc.): Category one Category two Category three Category four	25-50 50-75 75-90 >90	20 45 65 75	Vegetated filter strip ⁵ : 5 meters 10 meters 20 meters Inter row	40 65 80 50	20 45 60 30
Granular treatment	99	80	Bunds ⁶ : Edge of field In-field	40 50	20 30
Spot Applications <0.1 A ⁶	99	80	Spot Applications <0.1 A ⁶	99	80
			Vegetated ditches ⁷	50	30
Riparian plantings ⁸	27-36	10	No-till or reduced tillage ⁹	50	30
			Retention pond ⁸	75	55
Participation in recognized stewardship program	99	80	Participation in recognized stewardship program	99	80
Functional riparian system alongside water ways, > 10 meters wide	99	80	Functional riparian system alongside water ways, > 10 meters wide	99	80

¹ AgDrift Tier 1 Ground Boom – point deposition estimates compared to field edge (1 m buffer): low boom, very fine to fine distribution, 50th percentile distribution.

² AgDrift Tier 1 Orchard Airblast – point deposition estimates for sparse orchard compared to field edge (1m buffer).

³ AgDrift Tier 1 Aerial – Fine to medium distribution, point deposition estimates compared to 25 foot non-ULF aerial buffer.

⁴ Range corresponds with EPA star program (<https://www.epa.gov/reducing-pesticide-drift/epa-verifield-and-catch-drift-reduction-technologies>).

⁵ MayPIL 2017

⁶ Assumes median field size of 0.278 km² (Xian and Roy 2016)

⁷ Washington State Department of Agriculture riparian vegetation pilot study (2015)

HEDGEROWS

(Long Skinny Forests)
More Than Just a Living Fence

Hedgerows for Clean Water

Plant native tree or shrub hedgerows along streams, ditches and other waterways.

- Shade will reduce water temperatures.
- A 10' wide hedgerow can reduce sediment in surface runoff by 60-70%.
- Hedgerows will trap and utilize nutrients that might escape nutrient management systems.
- Hedgerows will act as a buffer for agricultural chemical applications.
- Hedgerows increase infiltration and decrease the rate of surface water runoff.

Species for Water Quality

- Willows
- Pacific Ninebark
- Red Osier Dogwood
- Black Twinberry
- Douglas Spirea
- Many others

Size and Location

- 10' to 15' wide minimum
- 2 or 3 rows
- 3' to 5' shrub spacing
- 8' to 10' tree spacing
- Plant close to the water



<http://www.whatcomcd.org/sites/default/files/hedgerows/Hedgerows.pdf>

Using Targeted Monitoring to Evaluate Mitigation Strategies that Reduce Pesticide Loading to Streams

A black and white photograph of a helicopter in flight, spraying a field. The helicopter is positioned in the center of the frame, with its main rotor blades blurred from motion. It is flying over a field of tall, dense vegetation, likely corn. In the background, there is a line of trees. The overall scene suggests agricultural pest control or pesticide application.

George Tuttle, Kelly McLain, Matthew Bischof, Jaclyn Hancock
Natural Resources Assessment Section (NRAS)
November 2015